# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE Applicant(s): MAIER et al.

Patent No.:

7,919,081 B1

Issued:

April 5, 2011

For:

HYDROGENASE DEFICIENT BACTERIAL STRAINS

### REQUEST FOR CERTIFICATE OF CORRECTION

Attention Certificate of Corrections Branch Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

Sir:

A Certificate of Correction is requested to be issued correcting printing errors appearing in the above-identified United States patent. A copy of the text noting the corrections for the Certificate is enclosed. Since the errors listed are due to Applicants' mistake, please charge Deposit Account No. 13-4895 in the amount of \$100 to cover the Certificate fee under 37 C.F.R. §1.20(a). The corrections in the proposed Certificate of Correction do not involve such changes in the patent as would constitute new matter or would require reexamination.

Please mail the printed Certificate of Correction to the undersigned attorney.

### CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper is being transmitted via the U.S. Patent and Trademark Office electronic filing system in accordance with 37 CFR §1.6(a)(4) to the Patent and Trademark Office addressed to: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on this 29day of Upril, 2011 By: Samur Truckent

anil 79 204

Date

Respectfully submitted

Ву

Mueting, Raasch & Gebhardt, P.A.

P.O. Box 581336

Minneapolis, MN 55458-1336

Phone: (612)305-1220 Facsimile: (612)305-1228 Customer Number 26813

David L. Provence Reg. No. 43,022

Direct Dial (612)305- 1005

е	Printer
	Tri
	Lie

### UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO.:	7,919,081 B
DATED:	April 5, 2011
INVENTOR(S):	Maier et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the face page under (73) Assignee:

add

The Ohio State University 1960 Kenny Road Columbus, Ohio 43065

MAILING ADDRESS OF SENDER:

PATENT NO. 7,919,081

No. of add'l copies

MUETING, RAASCH & GEBHARDT, P.A. P.O. BOX 581336 MINNEAPOLIS, MINNESOTA 55458-1336 **Customer Number 26813** 

0



The Ohio State University

Columbus, Ohlo 43065

1960 Kenny Road



### (12) United States Patent

Maier et al.

(10) Patent No.: US 7,919,081 B2 (45) Date of Patent: Apr. 5, 2011

### (54) HYDROGENASE DEFICIENT BACTERIAL STRAINS

(75) Inventors: Robert J. Maier, Athens, GA (US); John S. Gunn, Powell, OH (US)

(73) Assignee: University of Georgia Research Foundation, Inc., Athens, GA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 540 days.

(21) Appl. No.: 10/591,203
 (22) PCT Filed: Feb. 28, 2005
 (86) PCT No.: PCT/US2005/006638

(87) PCT Pub. No.: WO2005/086669 PCT Pub. Date: Sep. 22, 2005

§ 371 (c)(1),

(2), (4) Date:

(65) Prior Publication Data

US 2009/0081257 A1 Mar. 26, 2009

## Related U.S. Application Data

Jun. 22, 2007

(60) Provisional application No. 60/549,306, filed on Mar. 2, 2004, provisional application No. 60/604,846, filed on Aug. 26, 2004.

(51)	Int. Cl.	
	A01N 63/00	(2006.01)
	A61K 48/00	(2006.01)
	A61K 39/00	(2006.01)
	A61K 39/02	(2006.01)
	C12N 1/20	(2006.01)
	C12N 15/87	(2006.01)
		10100 10 1010

(56) References Cited

#### OTHER PUBLICATIONS

Sawers et al. J. Bacteriol. 168: 398-404, 1986: Kim et al. Appl. Environ. Microbiol. 62: 1795-1763, 1996. Schlecht et al. Naturvissenschaften 80: 9-17, 1993, abstract. Olson, Josathan W., et al. "Requirement of Nickel Metabolism Protions HypA, and HypB for Full Activity of Both Hyprogenses and Unease in Helicobacter pylors" Molecular Microbiology (2001) 39(1), 176-182.

PCT International Search Report for PCT/US2005/006638 completed by the United States Searching Authority on Feb. 1, 2006. Adams et al. 1981. "Hydrogenase." Biochim. Biophys. Acta. 594:105-176. Adams. (Ed). "Enzymes and proteins from hyperthermophilic microorganisms; Advances in protein chemistry." vol. 48. Academic Press, San Diego, CA, 1996. Title Page, Table of Contents.

San Diego, CA. 1996. Inte Page, 1able of Contents.

Albracht et al. "Mechanism of Hydrogen Activation," 2003. (Eds),

Blochemistry and Physiology of Anaerobic Bacteria. SpringerVerlag, New York, 2003. pp. 20-34 and Table of Contents.

Alper. Apr. 2003. "Putting an Exotic Enzyme together." ASM News, 69:170-171. Available online [retrieved on Aug. 16, 2010]. Retrieved from the Internet at: <a href="http://forms.asm.org/microbe/index.asp/bid=14506-;">http://forms.asm.org/microbe/index.asp/bid=14506-;</a> 2 pas.

Andrews et al. 1997. "A 12-cistron Escherichia coli operon (hyf) encoding a putative proton-translocating formate hydrogenlyase system." Microbiology, 143:3633-3647.

Black et al. 1994. Sequences and characterization of hupU and hupV genes of Bradyrhizobium japonicum encoding a possible nickelsensing complex involved in hydrogenase expression. J. Bacteriol. 176:7102-7108.

Blaser. "Helicobacter pylori and gastric diseases." Clinical Review. BMJ. 1998. 316:1507-1510.

Bock et al., "Fermentation," Chapter 18 in Escherichia coli and Salmonella pphilmurium; Vo. 1, ASM Press, Washington, D.C. 2002; F.C. Neidhardt et al. (Eds). Available online at: <a href="http://www.ccosal.org/pdf/ecosal-chapter-18.pdf">http://www.ccosal.org/pdf/ecosal-chapter-18.pdf</a>.

Bond et al. 1975. "Investigation of small bowel transit time in man utilizing pulmonary hydrogen (H<sub>2</sub>) measurements." J. Lab. Clin. Med. 85:546-555.

Boyer et al. 2002. "Acquition of Mn(II) in addition to Fe(II) is required for full virulence of Salmonella enterica serovar typhimurium". Infect. Immun. 70:6032-6042.

Brown et al. 1987. "Adaption of hydrogen analysis to measure stomach to caecum transit time in the rat." Gut. 28:849-854.

Casalot et al. 2001. "Maturation of the [NiFe] hydrogenases." Review. *Trends in Microbiology*. 9(5):228-237. Cummings. "Fermentation in the human large intestine: evidence and

implication for health." 1983. Lancet 1 1206:1209.

Datsenko et al. 2000. "One-step inactivation of chromosomal genes in Escherichia coli K-12 using PCR products." Proc. Natl. Acad. Sci.

USA. 97(12):6640-6645. de Bruyn et al. 2000. Best Practice. Clinical Evidence. "Infectious

Diseasé: Diarrhea." 172:409-412.
Doig et al. 1999. "Helicobacter pylori physiology predicted from genomic comparison of two strains." Microbiol. & Mole. Biol. Rev. 63(3):657-707.

Ellermeier et al. 2002. "Construction of targeted single copy lac fusions using lamhda Red and FLP-mediated site-specific recombination hacteria." Gene 290:153-161.

Ferher et al. 1993. "Hydrogen-uhiquinone oxidoreductase activity by the *Bradyrhizobium japonicum* memhrane bound hydrogenase." FEMS Microbiol. Lett. 110:257-264.

### (Continued)

Primary Examiner - S. Devi

(74) Attorney, Agent, or Firm — Mueting Raasch & Gebhardt, P.A.

### (57) ABSTRACT

The present disclosure describes pathogenic bacteria that have been modified to be deficient in NiFe hydrogenase activity; compositions comprising such modified bacteria, and the use of such bacteria to protect animals from pathogenic enteric bacterial infections.

3 Claims, 4 Drawing Sheets